User Manual

Human Machine Interface
BACnet/IP - Slave

UMBIPA
Rev: 06/2012

GRAPHIC SYMBOLS

INFORMATION, it helps users with more details about the topic and failure to follow may lead to unpredictable results.

WARNING, Failure to follow may lead to minor injury or damage / malfunctioning of equipment

DANGER, Failure to follow may lead to injury or fatal accident to operating personal or damage/malfunctioning of equipment

CAUTION, Failure to follow may lead to malfunctioning of equipment, damage or repair

Protective Earth

DC Supply

PREFACE

Original equipment manufacturer reserves the right to change information available in this document without notice. Original Equipment manufacturer is not liable for any damages incurred to equipment/personal during installation or use of equipment as explained in this document. User must acquire sufficient knowledge & skills prior to use the equipment in the application and follow all the local standards & regulations to meet safety requirements

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WAGO BACnet Configurator ®, is registered trade mark of WAGO Kontakttechnik Gmbh Co. Kg
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1. OVERVIEW

1.1 Introduction

BACnet/IP (Building Automation Control networking protocol) is a communications protocol developed by ASHRAE and popular in Building automation. The module has 2 nos. RJ45 ports, one for IN and one for OUT

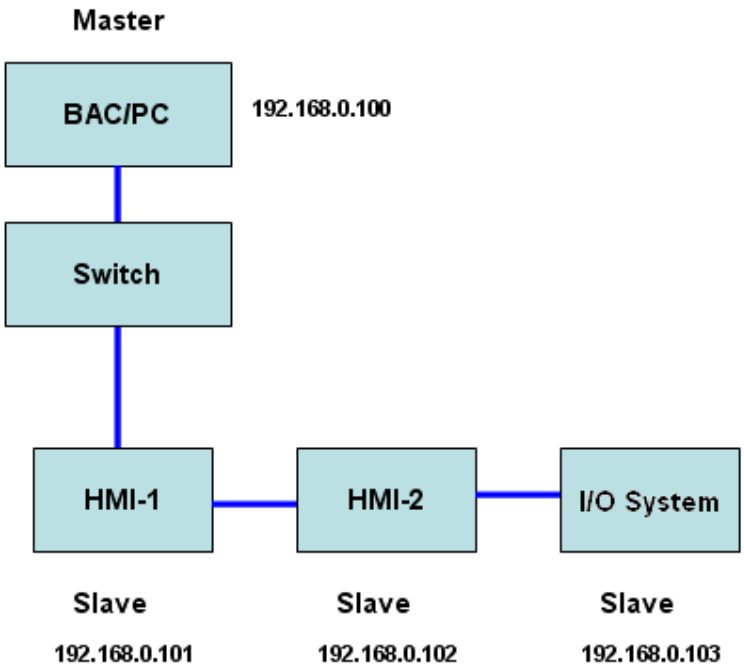


Fig: Typical configuration

HMI supports BACnet/IP slave functionality using plug in optional extension card. Check HMI ordering code for Network extension card availability

BACnet/IP supports several networking topologies but not limited to Start, Ring & Linear etc..

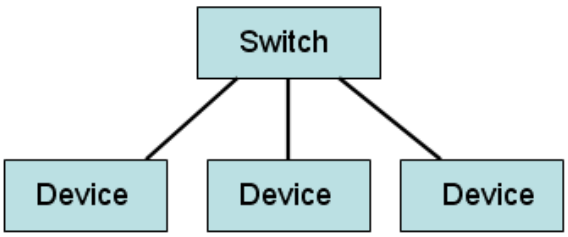


Fig: BACnet/IP- Star Topology

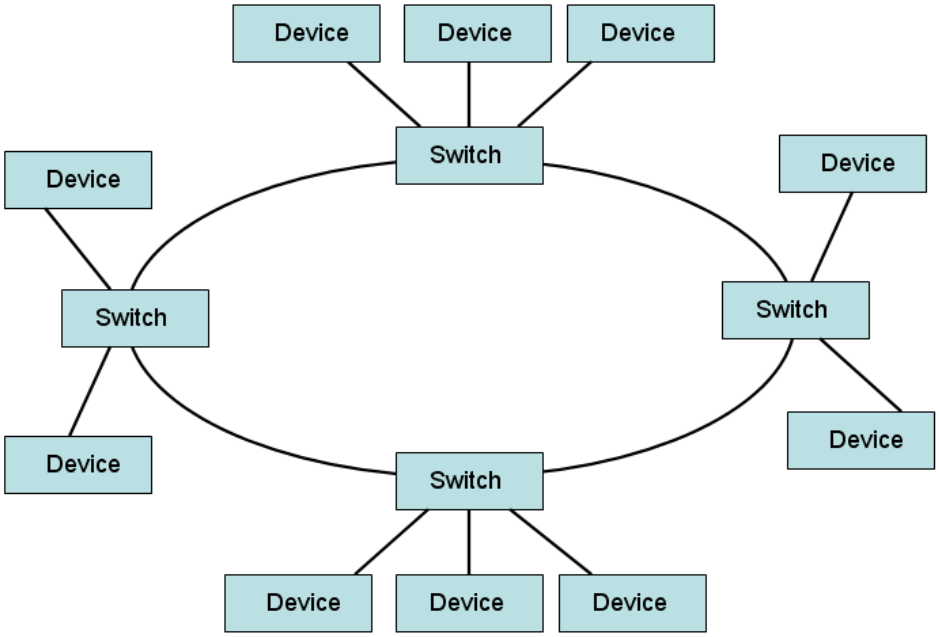


Fig: BACnet/IP- Switch ring Topology

1.2 Communication

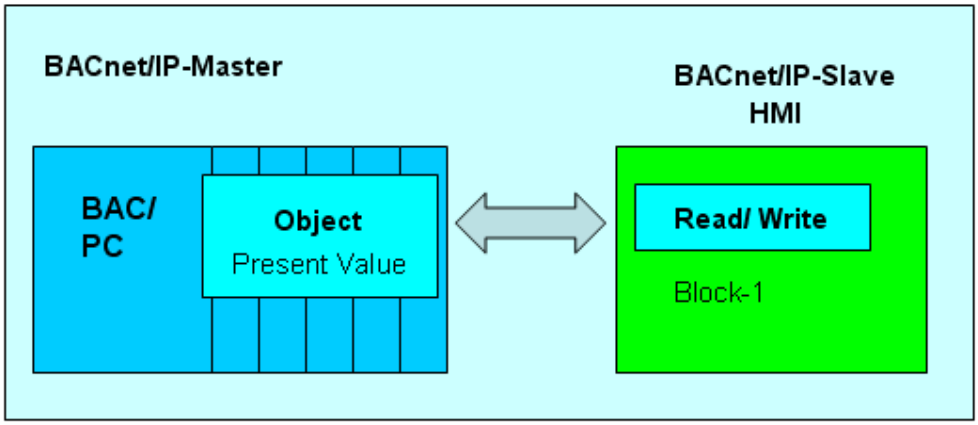


Fig: Data exchange between master and slave

2. SPECIFICATIONS

Item	Description
Port number in HMI	COM3 (for network option, extension card)
Master to Slave/ Slave to Master	Max 256 objects. Maximum data length = 256 bytes. So, number of objects depend on data type configured for the blocks in HMI configuration
Supported baud rates	10/100 Mbit full/half duplex operation
Data types supported	Byte, Int16, Int32, UByte, UInt16, UInt32, Float
Number of RJ45 ports	2 (One for IN & one for OUT to connect with other BACnet/IP device)
Network identity	
Vendor ID	486
Device Name	Controller
Model name	ABCC
Vendor Name	BC-HMI

3. EXTENSION CARD INSTALLTION

COM3 is dedicated for extension card. It is clearly marked on rear side of HMI.

Check HMI ordering code for Network extension card availability

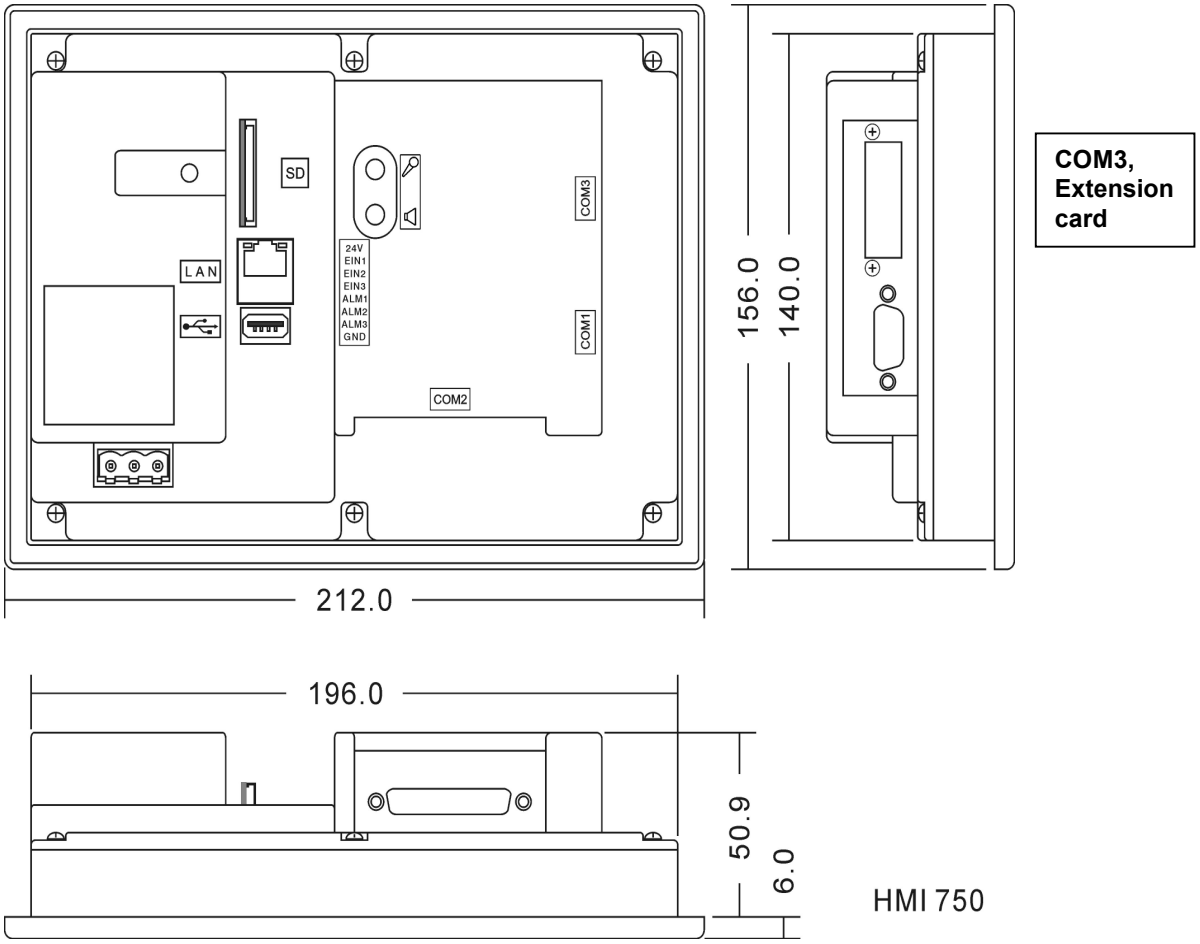


Fig: Typical dimensional drawing of HMI 7”

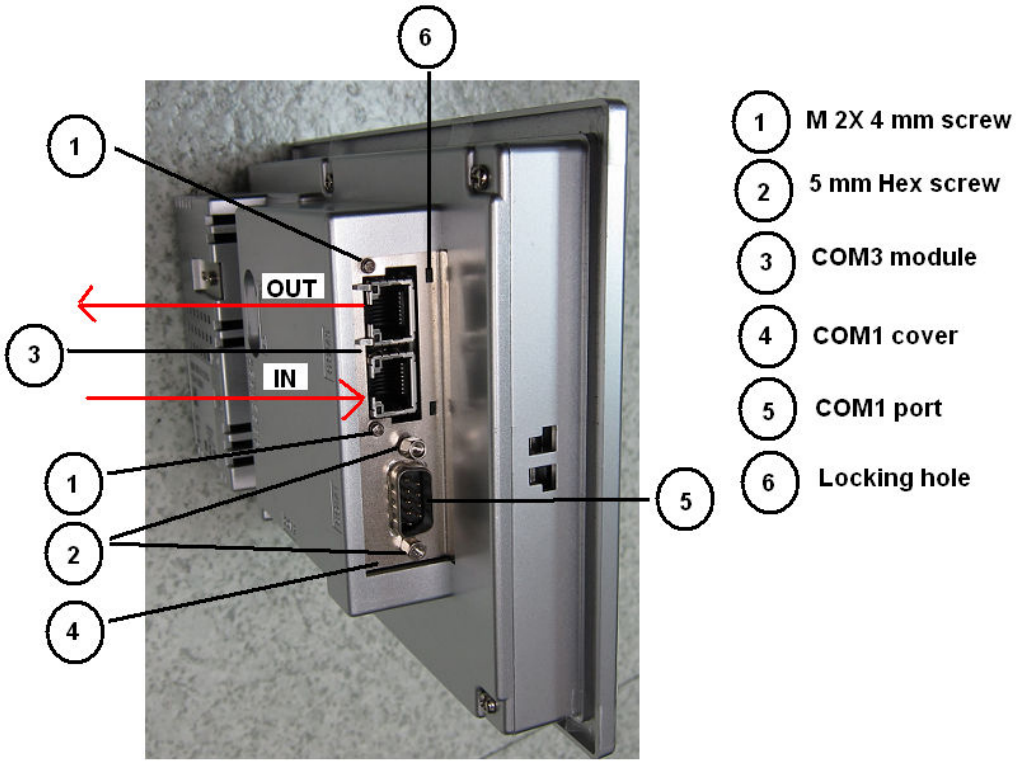


Fig: Typical HMI 7" with BACnet/IP module

1. Open HMI rear cover by removing all the screws
2. Remove M2 X 4 mm screws (2 nos.) and open network module blank cover
3. Remove 5 mm hex screws (2 nos.) for COM1 port using tool 5mm Hex nut screwdriver
4. Remove COM1 cover. At this time, COM1 enclosure will be opened. Note down the direction of enclosure carefully as it need to fit in same direction later
5. Remove 5 mm hex screws for network extension card
6. Now, insert network extension card into main board and make sure it is properly inserted with in guider pins

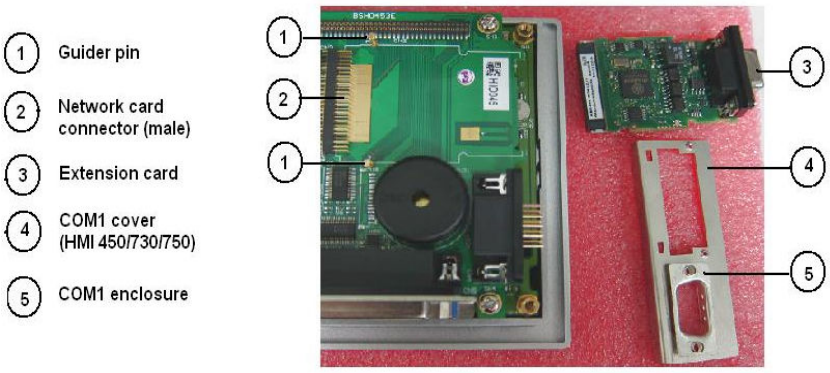


Fig: Extension card connector and guider

7. Fix COM1 cover properly and make sure that PCB is locked with in locking holes

8. Fix 5 mm hex screws (2 nos.) for COM1 port

9. Fix network module cover. Remember, these covers are different for different network extension modules. You will receive specific network module cover along with network extension card

10. Fix 5 mm hex screws (2 nos.) for network extension card. If required gently push network extension card downside to allow screws go inside properly

11. Fix M2 X 4 mm screws (2 nos.) on network module cover. If required gently push network extension card downside to allow screws go inside properly

12. Close the HMI rear cover

4. QUICK SETUP

Tips

Steps

1. First decide how much data to be exchanged between Master and Slave.

2. In HMI configuration, create required blocks. They support Read/Write operations

3. Open Tag data base from Project explorer. It is possible to modify blocks to Tag names at Tag database here. Once block name is changed to Tag name, never attempt to delete the network setup from connection as you will loose all the Tag names.

4. Link tags with Objects like Label, Text box etc... Once Tag is linked with objects, never attempt to delete network configuration from Connections.

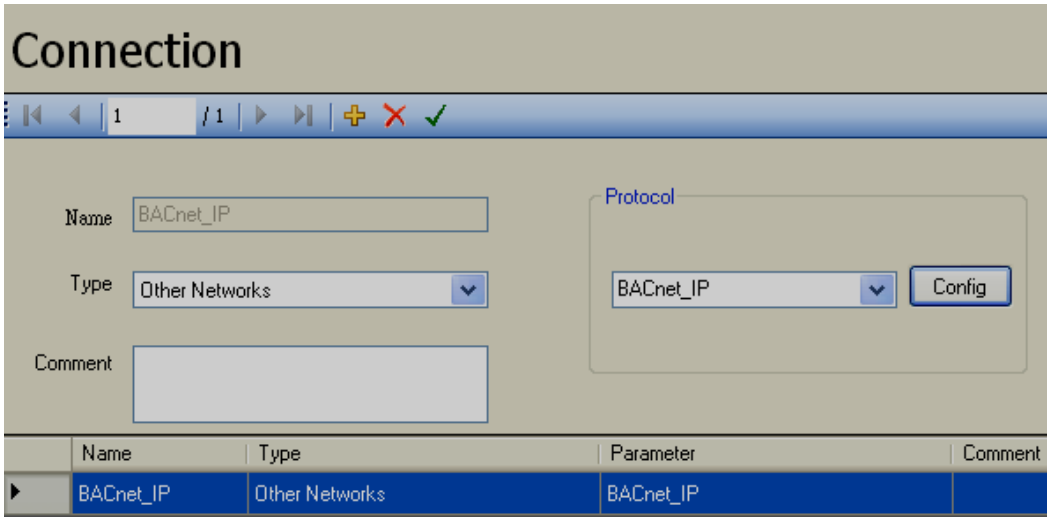
5. Make sure HMI (COM3) is connected to PLC on BACnet/IP. Download application from PC to HMI

6. Switch OFF power supply to HMI. Press your finger on HMI active screen area and then switch ON the power. On Control center, press “Run”.

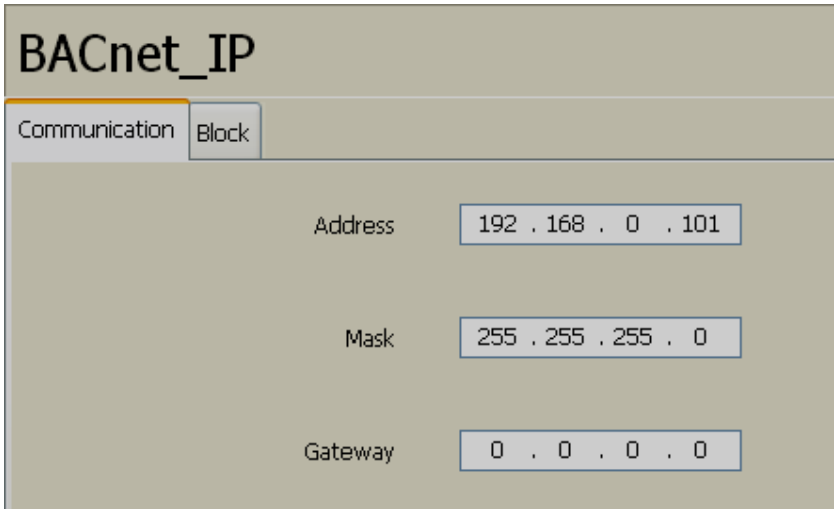
7. Put PLC in RUN mode and check communication between PLC and HMI

5. HMI CONFIGURATION

1. In project explorer, double click at “Connections”
2. Click to add a new connection.
3. Select Type= Other Networks. Select Protocol = BACnet_IP, then click apply icon to save this setup



4. Click “Config” to open BACnet/IP slave configuration
5. Select Communication and enter settings



Address: Enter unique IP address of HMI device being configured as Slave in BACnet/IP network

Mask: Enter subnet mask address

Gateway: Enter gateway address

6. Select “Block” and add required blocks as per requirement.

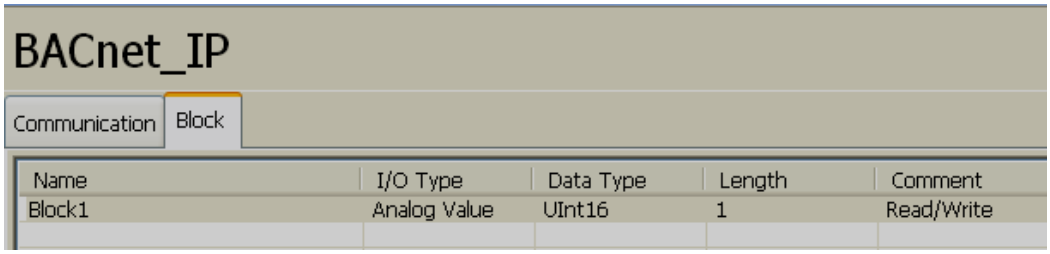


Fig: HMI configuration screen

Each Block is linked with one BACnet/IP object. Length indicates elements in specific BACnet/IP object. By default, length = 1, Type = UInt16.

If there is only one block, UInt16 type, then, maximum length =128

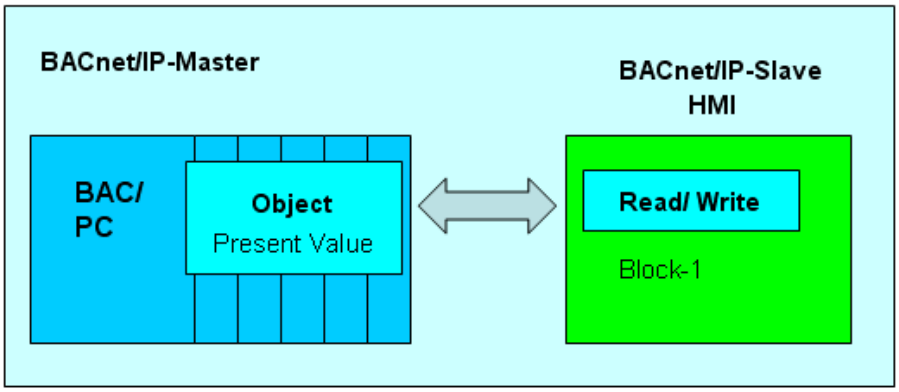


Fig: Communication data format for data exchange

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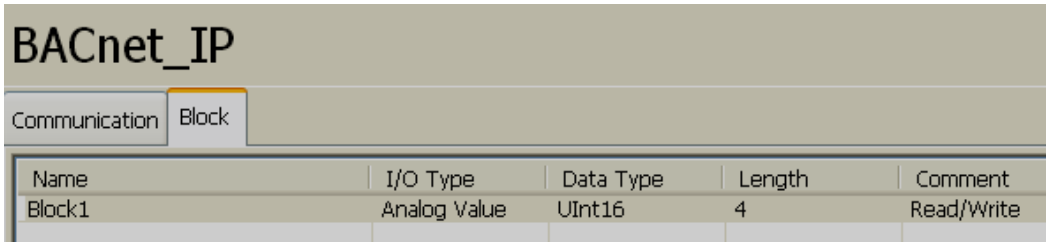
	HMI data type	**Value Range**
1	Byte	-128 to 127
2	Int16	-32768 to 32767
3	Int32	-2,147,483,648 to 2,147,483,647
4	UByte	0 to 255
5	UInt16	0 to 65535
6	UInt32	4294967295
7	Float	-3.402823E38 to -1.1754944E-38 (negative values) and 0 and 1.1754944E-38 to 3.402823E38 (positive values)

7. Make sure that all the required blocks are entered in HMI slave configuration screen in HMI editing software. Then, click “OK” to finish block configuration

8. In project explorer, double click “Tags” and check all the network tags. If required, it is possible to modify Tag names here. Once tag names are modified and linked with objects, do not attempt to modify configuration of

blocks again at connections in Project explorer. Before modification of tag names in tag data base, make sure block settings are completely finished at Connections



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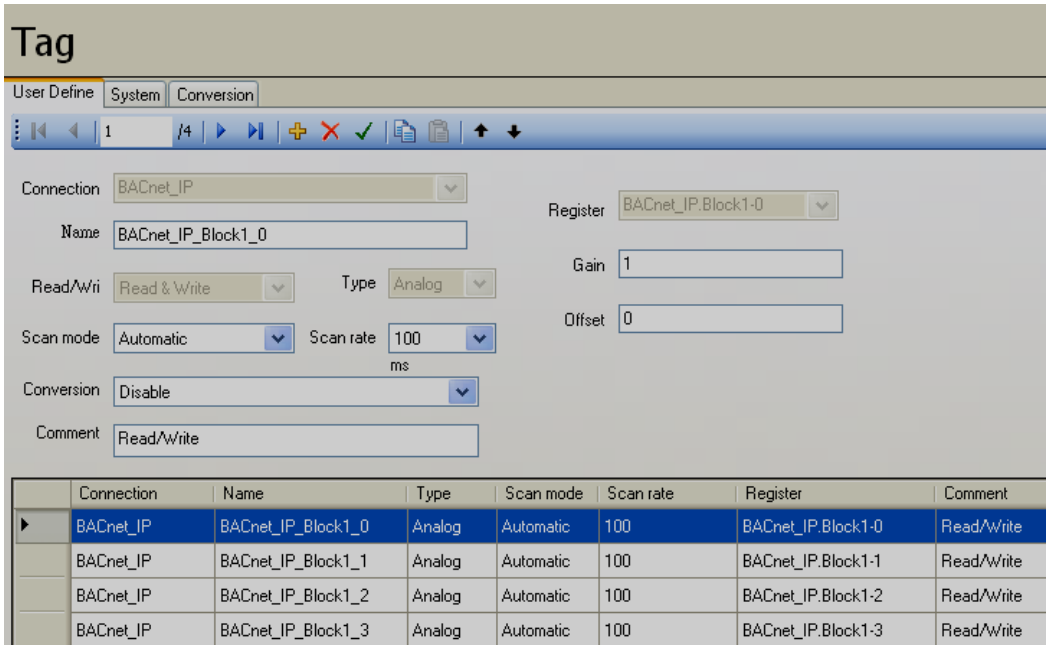


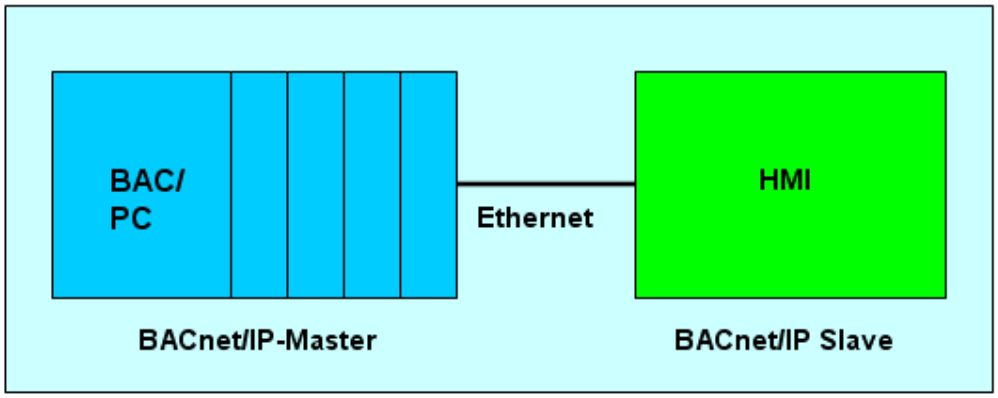
After application download to HMI, please recycle power to HMI.

Switch OFF power supply to HMI and switch ON power supply to HMI. Then only networking application works properly. At power on, it might show message “Extension card fail” in HMI. Press “OK”. If tags are linked with text boxes, it may show “Error” while reading data from Master to Slave. Once Master is started, communication will be established with slave and “Error” message disappears in objects and show real time data

6. MASTER CONFIGURATION

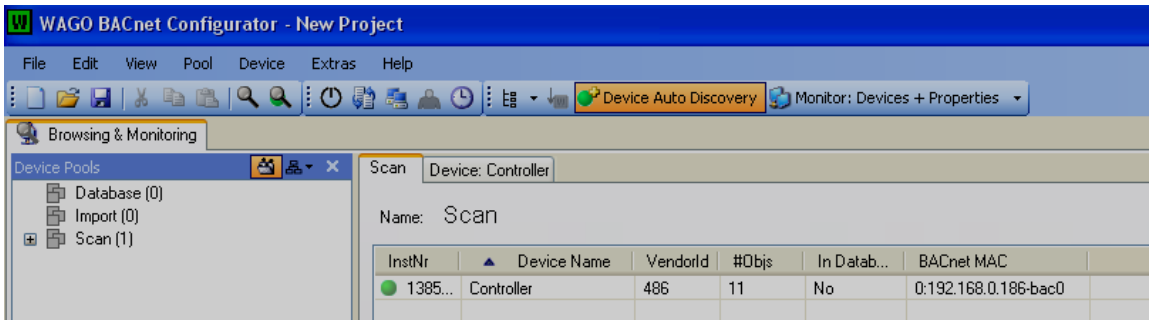
In this case WAGO BACnet Configurator® used as a Master on the BACnet/IP network.

It is expected user is fully aware how to configure BACnet/IP at Master side and familiar with specific software used. If any questions on master side, please contact the vendor directly

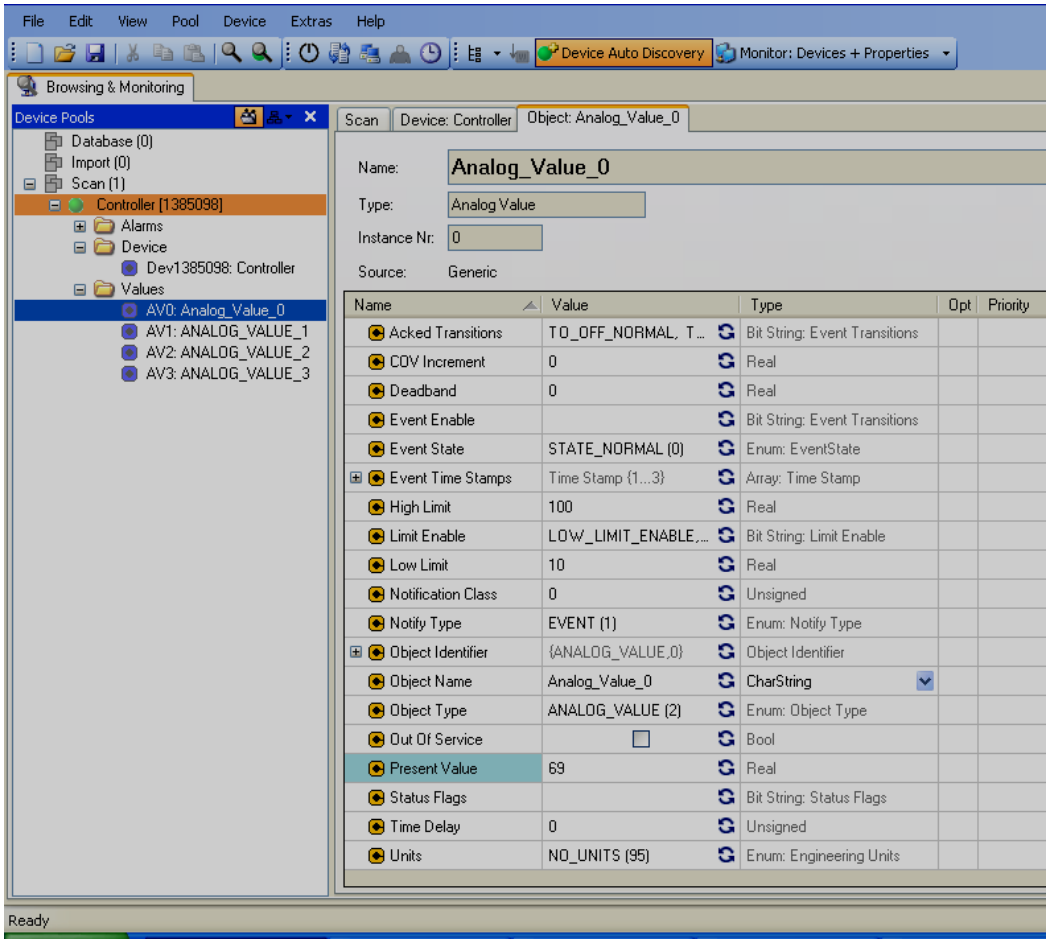


Note: After downloading application from PC to HMI, please remove Ethernet cable from standard Ethernet port in HMI. Connect Ethernet cable at RJ45 port in BACnet/IP network module

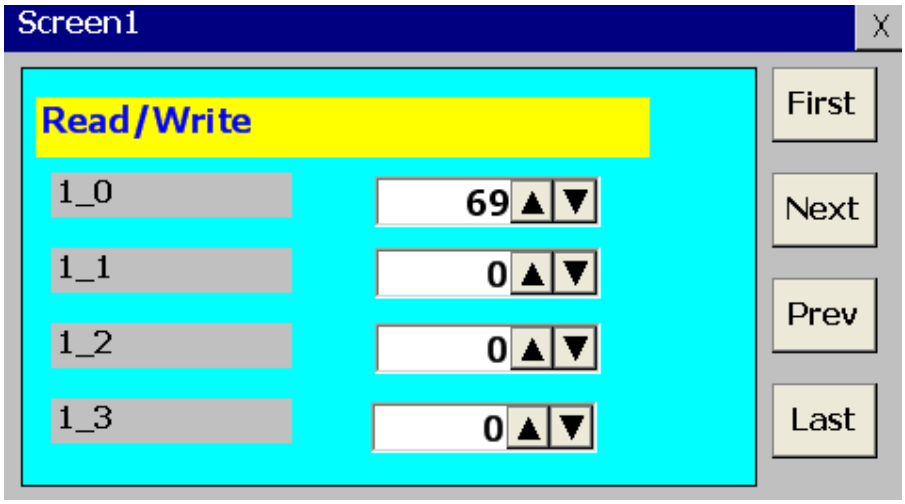
Open WAGO BACnet Configurator

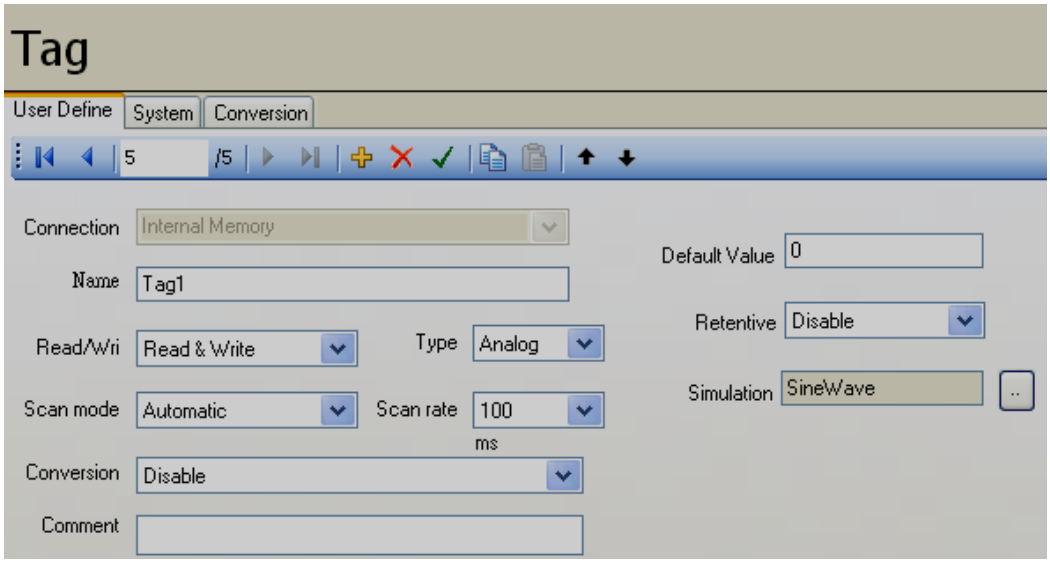


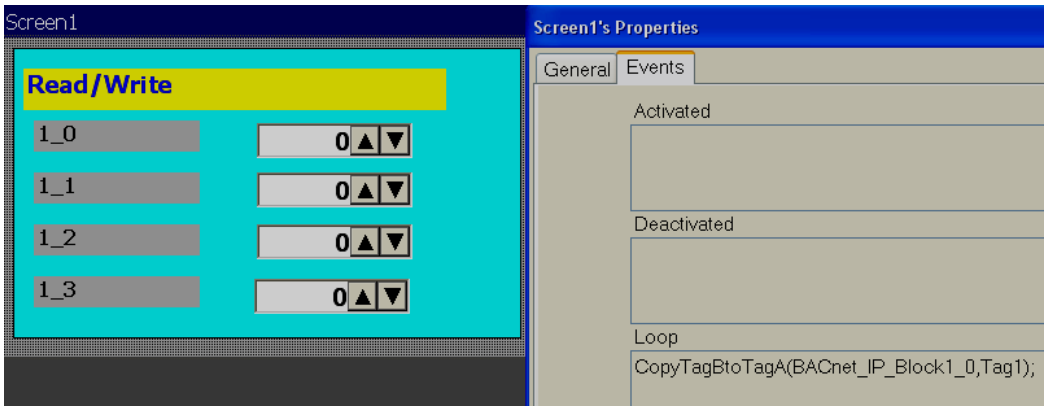
If there is a good connection between PC running WAGO BACnet Configurator and HMI (BACnet/IP module), then, HMI will be detected automatically as “Controller” and display as shown above



Note: Observer Present Value updating automatically at Analog_Value_0 (In the demo program, simulation selected for HMI Internal memory Tag1 and then copy this to Block1 in BACnet/IO module as shown in next page)







All tags are Read/Write type.
If you change value at Master, it will update in HMI
If you change value at HMI, it will update in Master

Note: You may try this at Block1_1, 1_2 & 1_3 in the demo program

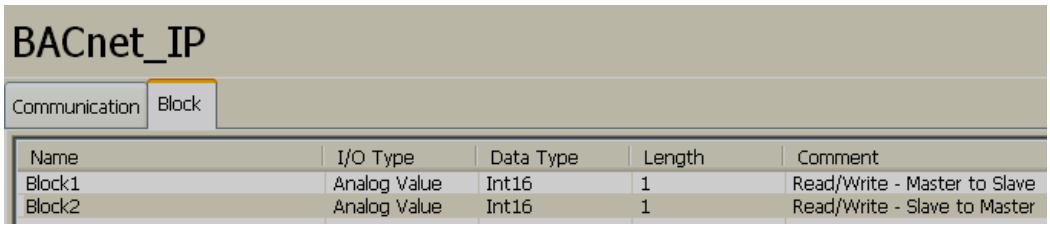
7. CONVERTER

It is possible to do scaling in HMI application for Read/Write blocks

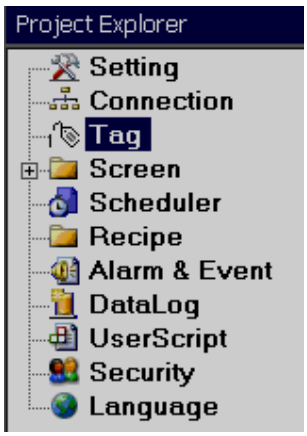
Task1: Read (Master to Slave)
PLC Value range=-32768 to 32767.
Convert this to 0 to 100 and display in HMI
Use Block1, Signed integer 16 type in HMI configuration

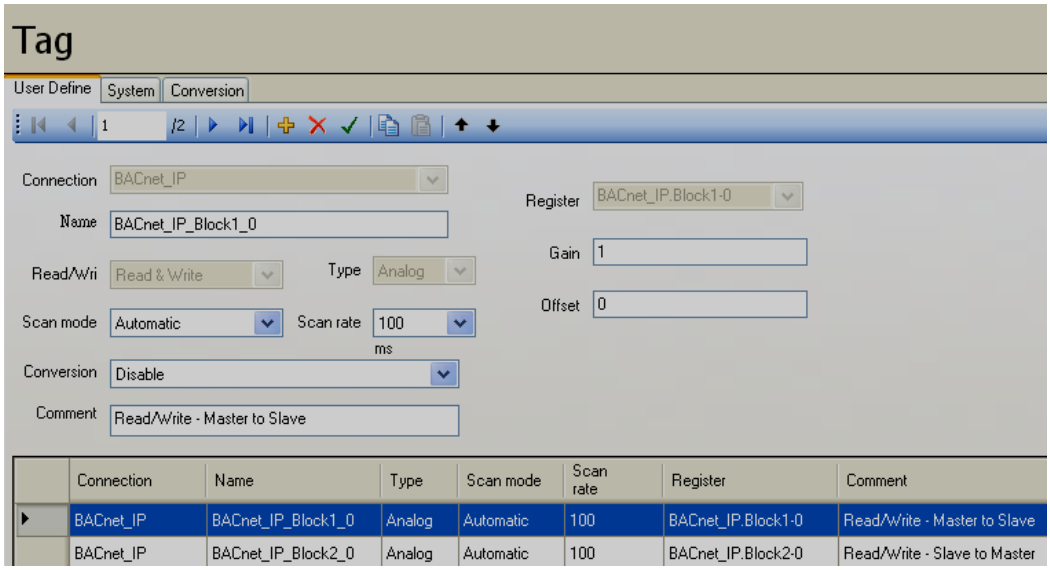
Task2: Write (Slave to Master)
Write 0 to 100 in HMI. Convert this to -32768 to 32767 and send to PLC
Use Block2, Signed integer 16 type in HMI configuration

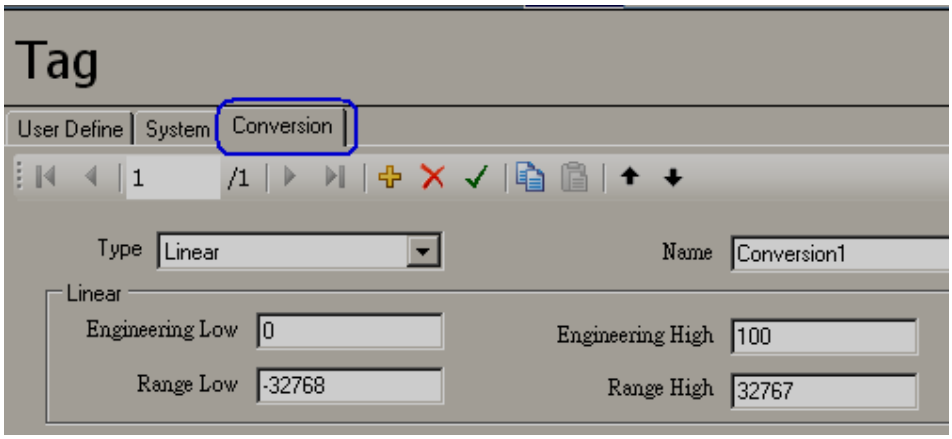
Read, Block1_0		**Write, Block2_0**	
Value at PLC	**Value Read in HMI**	**Value write in HMI**	**Value at PLC**
-32767	0	0	-32767
0	50	50	0
32767	100	100	32767



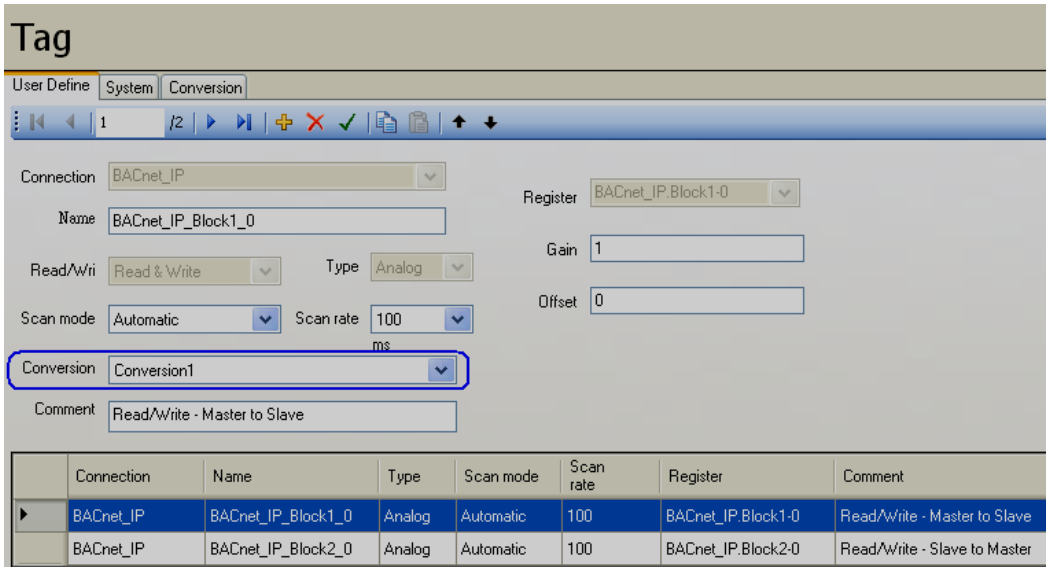
Note: Create a new project to test this (Do not use demo project)







Enter Scaling equation at “Conversion” tab



Select required Conversion equation for the networking tags as shown above. Select this for both Block1_0 and Block2_0

8. FAQ

1. Can we order HMI first and then network extension card later? Can I fix network extension card my self?
   Yes, it is possible.

2. All HMI support network extension card
   Check HMI ordering code for Network extension card availability

3. After inserting network extension card, HMI is Master or Slave on specific network?
   Slave

4. Is it possible to have more than 1 HMI in BACnet/IP network
   Yes, it is possible.

5. Is it possible to connect 1 HMI to 2 Masters on BACnet/IP?
   No, it is not possible.

6. Can I access PLC addressing areas directly in HMI software
   No, it is not possible

7. What is the maximum data I can exchange between Master and Slave
   256 bytes.
   If Int16 is selected, then, max. 128 objects
   If Byte is selected, then, max. 256 objects

8. What are the settings required in BACnet/IP slave
   Ethernet, Mask, Gateway address and block configuration is required.

9. How many blocks I can add in HMI configuration.
   It depends on block length. By default, block length=1. We suggest defining only two blocks, one for Read and one for Read. Then, define length as per your project requirements to avoid complexity

10. I am getting message “Extension card fail” in HMI after power on.
    Make sure network card inserted in slot. Please switch OFF power supply to HMI and Power ON again after downloading application from PC to HMI.

11. I have 2 HMI configured as BACnet/IP slave. Can I connect both these HMI’s to Ethernet switch and exchange data with Master?
    Yes, it is possible. Make sure you follow one of right topology to be used for BACnet/IP

12. Can I exchange data between two slaves directly with out Master?
    No, it is not possible. You must do this via Master only